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## Description

Chocolate compositions containing such conventional ingredients as cocoa powder, cocoa butter, cocoa butter equivalents, sugar, emulsifier need to be tempered because of the presence of polymorphic fats such as POP, POST and/or STOST (P = palmitic acid, St = stearic acid and O = oleic acid). Still, it was very difficult to avoid bloom formation, i.e. a polymorphic transformation of the crystal lattice. Therefore, many attempts have been made to find additives that could prevent bloom formation in chocolate compositions. Examples of such additives are butterfat, fully hardened, high-erucic rapeseed and BOB (B = behenic, O = oleic).

However, very often the results obtainable with these additives are not satisfactory. Therefore, we have conducted a study in order to find out whether it was possible to find a new, more effective additive.

## Prior Art

From US 2,979,401 stabilizing ingredients for solid chocolate materials or chocolate-coated products are known that are included in the chocolate in amounts of 0.5-5 wt.%. The stabilizing ingredients consist of triglycerides of lauric, myristic and palmitic acid, preferably in molar ratios of 2.0 : 1.2 : 2.0. Minor amounts of other fatty acids do not change the basic character of the ingredients. The ingredients are used to stabilize the colour of chocolate upon storage. Because of the very strict requirements set to the fatty acid components of the triglycerides that may be used, these products have never been applied commercially.

From US 3,491,877 it is further known that bloom formation can be inhibited by utilization of fatty compositions that are mixtures of natural interesterified triglycerides comprising short-chain fatty acids and long-chain fatty acids while the iodine value (= I.V.) of the compounds is 30-55 and the melting point is low. As a consequence of the above-mentioned requirements, only a limited range of triglycerides could be applied while the low melting point may create problems as regards the properties of the chocolate composition.

From EP 390,408 triglyceride compositions are known that contain high levels (at least 85%) of combined MLM and MML (M = saturated fatty acid  $C_6-C_{10}$ ; L = saturated fatty acid  $C_{20}-C_{24}$ ) and low levels (i.e. at most 10 wt.%) of triglycerides LLM and LML (combined). These fats should always contain  $C_6$  and  $C_{10}$  fatty acid residues (35-60 wt.%) in a ratio of 1:4 to 4:1, while also 35-60 wt.% of behenic acid should be present. Minor amounts of  $C_{12}-C_{18}$  fatty acids can be present in the fats.

The fat phase comprising the above-mentioned triglycerides should contain less than 20 wt.% of cocoa butter (i.e. less than 15 wt.% of SUS; S = saturated  $C_{16}/C_{18}$ ; U = oleic). The triglycerides are applied in order to reduce the caloric value of compositions normally containing cocoa butter by replacing cocoa butter by these mixed triglycerides.

## The Invention

We have now found that the drawback of the prior art can be overcome by the use of a particular hardstock fat in the chocolate composition. Therefore, our invention is concerned with chocolate compositions consisting of at least the conventional chocolate ingredients and at least 25 wt.% of a fat, which compositions are characterized by the presence of an amount of ( $H_2M + HM_2$ )-fat that contain at least 5 wt.%, preferably at least 20 wt.%, of stearic acid and that display an iodine value of less than 20, preferably less than 5, of at least 0.5 wt.%, while the SOS content of the composition is at least 15 wt.%, in which :

- H means saturated fatty acid with  $\geq C_{15}$ , preferably  $C_{16}-C_{18}$ ;
- M means saturated fatty acid with  $C_{12}-C_{14}$ ;
- S means saturated fatty acid with  $C_{16}$  and/or  $C_{18}$ ;
- O means oleic acid.

The above-mentioned requirement of at least 0.5% ( $H_2M + HM_2$ ) in the composition can be fulfilled by the addition of the lauric fat (=  $HM_2 + H_2M$  fat) to the chocolate composition. The chocolate composition can then be used for the preparation of such chocolate products as chocolate bars. For this purpose, the chocolate is tempered before it is moulded into bars.

In this way, products are obtained that have an increased resistance to blooming.

The best results are obtained when the ( $H_2M + HM_2$ ) content is at least 0.6 wt.%, preferably 0.8-2.0 wt.%,

As hard fat component containing ( $H_2M + HM_2$ ), interesterified mixtures of vegetable oils high in triglycerides with fatty acid residues with at least 16 C atoms and triglycerides rich in lauric and/or myristic acid residues can be used advantageously. Examples of such fat mixtures are mentioned in, e.g., our

Australian patent application 12346/83, Ser. Nr. 549,465.

In particular, interesterified mixtures of hardened palm oil and hardened palmkernel oil, such as an interesterified mixture of PO-58 and PK-39, are very suitable. Fractions of these products can also be used. For instance, the olein fraction of the wet fractionation of such an interesterified fat mixture also gives very satisfactory results.

Very suitable lauric hardstock fats display melting points of at least 35°C, while the weight ratio  $C_{12}/C_{14}$  in these fats is preferably more than 2.

The hardstock can be used in any kind of chocolate composition. So, plain chocolate and milk chocolate can both be used. The chocolate can also contain other ingredients, such as flavour, fruit components etc.

The invention also concerns a process for the production of the chocolate composition. The products are made in a conventional way, whereby the  $(H_2M + HM_2)$ -containing hardstock is incorporated into the composition, whereupon the compositions thus obtained are tempered and the tempered compositions are used for the preparation of such confectionery products as chocolate bars.

Furthermore, our invention is concerned with the use of the lauric fat compositions in order to achieve retardation of bloom of chocolate compositions.

The invention will now be illustrated by the following non-limiting Examples.

### EXAMPLES

I. Chocolate compositions were made with the composition as mentioned in Table 1.

TABLE 1

	A	B
Cocoa powder (10/12)	190	190
Cocoa butter	260	260
Sugar	500	500
Cocoa butter equivalent	50	30
Hardstock	-	20
Emulsifier	4	4

So, the hardstock is present in an amount of 2% in composition B.

Hardstock is an interesterified mixture of hardened palm oil (melting point 58) and palm kernel oil (melting point 39).

The carbon number analysis of the hardstock is :

$C_{30}-C_{38}$  : 4.1%;  $C_{40}$  : 4.1%;  $C_{42}$  : 9.8%;  $C_{44}$  : 12.5%;  $C_{46}$  : 21.4%;  $C_{48}$  : 23.0%;  $C_{50}$  : 10.6%;  $C_{52}$  : 9.0%;  $C_{54}$  : 5.3%;

The FAME of the hardstock was as follows :

$C_{12}$  : 20.1%;  $C_{14}$  : 8.1%;  $C_{16}$  : 23.7%;  $C_{18}$  : 44.3%;  $C_{18:1}$  : 0.4%;  $C_{18:2}$  : 0.4% and others 3.1%. Its I.V. was 1.0.

The chocolate compositions were tempered and moulded into bars. The bars were stored in a cabinet, which was set to cycle between 15°C and 25°C at 12-hourly intervals. The bars were assessed for bloom at weekly intervals, with the following results :

Composition	Appearance of Bloom
A	After 1 week
B	Not within 13 weeks

II. In the following Examples the following hardstock fats were applied :

Carbon number	A	B	C
C <sub>30</sub> -C <sub>38</sub>	17.9	6.3	43.4
C <sub>40</sub>	10.1	5.7	13.6
C <sub>42</sub>	15.5	12.9	17.6
C <sub>44</sub>	11.8	13.7	9.8
C <sub>46</sub>	14.1	20.3	7.6
C <sub>48</sub>	13.8	21.3	5.0
C <sub>50</sub>	6.3	9.3	1.9
C <sub>52</sub>	5.7	7.3	1.1
C <sub>54</sub>	3.2	3.0	-

II.1 Bars were made from standard dark Callebaut chocolate. Different amounts of different fats were added to the composition according to the recipe below :

The chocolate bars were slab-tempered and then the bars were moulded and stored at 23 °C.

The following chocolate compositions were used :

1. 100% Callebaut chocolate
2. 98% Callebaut chocolate + 2% hardstock B
3. 95% Callebaut chocolate + 5% shea stearin
4. 98% Callebaut chocolate + 2% palm kernel fat
5. 98% Callebaut chocolate + 1% hardstock C

The bars were evaluated after 6 months at 23 °C:

Bloom score 5 = perfect; below 3 = unacceptable

Sample	H <sub>2</sub> M + M <sub>2</sub> H level on product	Bloom score
1	trace	2
2	1.5%	5
3	trace	3
4	0.3	2
5	0.55	5

II.2 Bars were made in a similar way as under II.1. However, the following chocolate compositions were applied:

1. 95% Callebaut chocolate + 5% cocoa butter equivalent (abt. 70% SOS);
2. 95% Callebaut chocolate + 2% fat B + 3% of the same CBE;
3. 95% Callebaut chocolate + 4% fat C + 1% of the same CBE;
4. 95% Callebaut chocolate + 4% fat A + 1% of the same CBE.

The bars were evaluated after 6 months' storage at 25 °C.

Sample	H <sub>2</sub> M + M <sub>2</sub> H level on product	Bloom score
1	trace	1
2	1.5	5
3	2.6	5
4	2.1	5

III. A batch of chocolate powder was made with the following composition :

Icing sugar	55%
Chocolate powder N11N	20%
Cocoa butter	25%
Lecithin	0.4%

The chocolate powder was blended, using a conch with fats according to the following recipe :

1. 95% chocolate powder + 5% of a CBE (palm mid/shear stearin);
2. 95% chocolate powder + 2% fat B + 3% of the same CBE.

The chocolate was tempered in a Leatherhead temper kettle in the usual manner.

Bars were moulded and stored at 20/32 °C (12 hours' cycling).

The bars were evaluated after 1 month's storage.

Sample	(H <sub>2</sub> M + M <sub>2</sub> H)-level on product	Bloom score
1	trace	1
2	1.5	4/5

IV. The chocolate powder of Example III was used. Bars were made in the same way, using, however, the following recipes :

1. 95% chocolate powder + 5% cocoa butter equivalent (abt. 70% SOS)
2. 95% chocolate powder + 3% of the same CBE + 2% fat B.

Evaluation after 4 months' storage at 25 °C showed :

Sample	(H <sub>2</sub> M + M <sub>2</sub> H)-level on product	Bloom score
1	trace	2/3
2	1.5	5

V. Example III was repeated, using, however, the following recipes :

1. 95% chocolate powder + 5% cocoa butter;
2. 95% chocolate powder + 2% cocoa butter + 3% butter fat;
3. 95% chocolate powder + 3% cocoa butter + 2% fat B.

Evaluation after 2 months' storage at 20/32 °C (12 hours' cycling) showed :

Sample	(H <sub>2</sub> M + M <sub>2</sub> H)-level on product	Bloom score
1	trace	1
2	0.4	1
3	1.5	5

#### Claims

1. Chocolate-containing compositions consisting of at least the conventional chocolate ingredients and at least 25 wt.% of a fat, which compositions are characterized by the presence of an amount of (H<sub>2</sub>M + HM<sub>2</sub>)-fat, containing at least 5 wt.%, preferably at least 20 wt.%, of stearic acid, and displaying an iodine value of less than 20, of at least 0.5 wt.% while the SOS content of the composition is at least 15 wt.%, in which :

- H means saturated fatty acid with  $\geq C_{16}$ ;
- M means saturated fatty acid with C<sub>12</sub>-C<sub>14</sub>;
- S means saturated fatty acid with C<sub>16</sub> and/or C<sub>18</sub>;
- O means oleic acid.

2. Chocolate compositions according to Claim 1, wherein the (H<sub>2</sub>M + HM<sub>2</sub>)-content is at least 0.6 wt.%, preferably 0.8-2.0 wt.%.
3. Chocolate compositions according to Claims 1-2, wherein the (H<sub>2</sub>M + HM<sub>2</sub>)-containing hardstock is an interesterified mixture of a vegetable oil high in triglycerides with fatty acid residues having at least 16 C atoms and a vegetable triglyceride rich in lauric and/or myristic acid residues.

4. Chocolate compositions according to Claim 3, wherein the hardstock is an interesterified mixture of hardened palm oil and hardened palm kernel oil.
5. Chocolate compositions according to Claim 4, wherein the hardstock is an interesterified mixture of PO-58 and PK-39 or fractions thereof.
6. Chocolate composition according to Claims 1-5, wherein the hardstock has a melting point of at least 35°C and a weight ratio  $C_{12}:C_{14}$  of more than 2.
7. Chocolate compositions according to Claims 1-6, wherein the chocolate composition is made of plain chocolate or milk chocolate.
8. Chocolate compositions having the composition as mentioned in Claims 1-7, wherein the compositions are tempered.
9. Chocolate bars comprising the tempered compositions of Claim 8.
10. Use of an ( $H_2M + HM_2$ )-containing hardstock in chocolate compositions, wherein the hardstock is used for the retardation of bloom of the chocolate of a product made of the chocolate composition, in which :
  - H = saturated fatty acid with  $\geq C_{16}$ ;
  - M = saturated fatty acid with  $C_{12}-C_{14}$ .

#### Patentansprüche

1. Schokoladenhaltige Zusammensetzungen, bestehend aus mindestens den herkömmlichen Schokoladenbestandteilen und mindestens 25 Gew.% eines Fetts, wobei die Zusammensetzungen gekennzeichnet sind durch das Vorliegen einer Menge an ( $H_2M + HM_2$ )-Fett, welches mindestens 5 Gew.%, vorzugsweise mindestens 20 Gew.%, Stearinsäure enthält und eine Jodzahl von weniger als 20 aufweist, von mindestens 0,5 Gew.%, während der SOS-Gehalt der Zusammensetzung mindestens 15 Gew.% beträgt; wobei:
  - H gesättigte Fettsäure mit  $\geq C_{16}$  bedeutet,
  - M gesättigte Fettsäure mit  $C_{12}-C_{14}$  bedeutet,
  - S gesättigte Fettsäure mit  $C_{16}$  und/oder  $C_{18}$  bedeutet,
  - O Ölsäure bedeutet.
2. Schokoladenzusammensetzungen nach Anspruch 1, worin der ( $H_2M + HM_2$ )-Gehalt mindestens 0,6 Gew.%, vorzugsweise 0,8 bis 2,0 Gew.%, beträgt.
3. Schokoladenzusammensetzung nach einem der Ansprüche 1 oder 2, worin die ( $H_2M + HM_2$ )-haltige hochschmelzende Fettkomponente eine umgeesterte (interesterifizierte) Mischung eines pflanzlichen Öls mit hohem Gehalt an Triglyceriden mit mindestens 16 C-Atome aufweisenden Fettsäureresten und ein pflanzliches Triglycerid mit hohem Gehalt an Laurinsäure- und/oder Myristinsäureresten ist.
4. Schokoladenzusammensetzungen nach Anspruch 3, worin die hochschmelzende Fettkomponente eine umgeesterte (interesterifizierte) Mischung aus gehärtetem Palmöl und gehärtetem Palmkernöl ist.
5. Schokoladenzusammensetzungen nach Anspruch 4, worin die hochschmelzende Fettkomponente eine umgeesterte (interesterifizierte) Mischung von PO-58 und PK-39 oder Fraktionen davon ist.
6. Schokoladenzusammensetzung nach einem der Ansprüche 1 bis 5, worin die hochschmelzende Fettkomponente einen Schmelzpunkt von mindestens 35°C und ein Gewichtsverhältnis von  $C_{12}:C_{14}$  von größer als 2 aufweist.
7. Schokoladenzusammensetzung nach einem der Ansprüche 1 bis 6, wobei die Schokoladenzusammensetzung aus Zartbitterschokolade oder Milkschokolade hergestellt ist.
8. Schokoladenzusammensetzung mit einer der in den Ansprüchen 1 bis 7 genannten Zusammensetzung, wobei die Zusammensetzungen temperiert sind.

9. Tafelschokolade oder Schokoladenriegel, umfassend die temperierten Zusammensetzungen von Anspruch 8.

10. Verwendung einer ( $H_2M + HM_2$ )-haltigen hochschmelzenden Fettkomponente in Schokoladenzusammensetzungen, wobei die hochschmelzende Fettkomponente zur Verzögerung des Ausblühens der Schokolade eines aus der Schokoladenzusammensetzung hergestellten Produkts verwendet wird, wobei

H = gesättigte Fettsäure mit  $\geq C_{16}$ ,

M = gesättigte Fettsäure mit  $C_{12}-C_{14}$  ist.

#### Revendications

1. Compositions contenant du chocolat consistant en au moins les ingrédients classiques du chocolat et au moins 25% en poids d'une graisse, compositions qui sont caractérisées par la présence d'une certaine quantité de graisse ( $H_2M + HM_2$ ) contenant au moins 5% en poids, de préférence au moins 20% en poids d'acide stéarique et ayant un indice d'iode inférieur à 20, d'au moins 0,5% en poids tandis que la teneur en SOS de la composition est d'au moins 15% en poids, dans lesquelles :

H signifie un acide gras saturé en  $C_{16}$  ou plus ;

M signifie un acide gras saturé en  $C_{12}-C_{14}$  ;

S signifie un acide gras saturé en  $C_{16}$  et/ou  $C_{18}$

O signifie l'acide oléique.

2. Compositions de chocolat selon la revendication 1, dans lesquelles la teneur en ( $H_2M + HM_2$ ) est d'au moins 0,8% en poids, de préférence de 0,8 à 2,0% en poids.

3. Compositions de chocolat selon les revendications 1 et 2, dans lesquelles le composant dur contenant ( $H_2M + HM_2$ ) est un mélange interestérifié d'une huile végétale riche en triglycérides et de restes d'acides gras au moins en  $C_{16}$  et un triglycéride végétal riche en restes d'acides laurique et/ou myristique.

4. Compositions de chocolat selon la revendication 3, dans lesquelles le composant dur est un mélange interestérifié d'huile de palme durcie et d'huile de cœur de palmier durcie.

5. Compositions de chocolat selon la revendication 4, dans lesquelles le composant dur est un mélange interestérifié de PO-58 et PK-39 ou leurs fractions.

6. Composition de chocolat selon les revendications 1 à 5, dans laquelle le composant dur présente un point de fusion d'au moins  $35^\circ\text{C}$  et un rapport pondéral  $C_{12}:C_{14}$  supérieur à 2.

7. Compositions de chocolat selon les revendications 1 à 6, dans lesquelles la composition de chocolat est préparée avec du chocolat ordinaire ou du chocolat au lait.

8. Compositions de chocolat selon les revendications 1 à 7, compositions qui sont conditionnées.

9. Barres de chocolat comprenant les compositions conditionnées selon la revendication 8.

10. Utilisation d'un composant dur contenant ( $H_2M + HM_2$ ) dans les compositions de chocolat, le composant dur étant utilisé pour retarder le bourgeonnement du chocolat dans un produit formé avec la composition de chocolat, dans laquelle :

H = acide gras saturé en  $C_{16}$  ou plus ;

M = acide gras saturé en  $C_{12}-C_{14}$ .